THE ELECTRICAL WORLD

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Science against Superstition.

It is a somewhat sad commentary on our modern civilization that so many of the prominent scientific inventions and applications derive their main importance from the part they play in warfare—in the destruction more than the protection of life and property on sea and on land. Electricity, though much the latest manifestation of force to be employed practically, has, of course, been summoned to the aid of naval and military strategists, and to day it is largely relied upon in all manner of offensive and defensive operations.

To take the electric light, we find that so long ago as 1855 the French naval authorities tried the electric light in the Baltic at the siege of Kinburn. In 1859 the Italian war led the French War Office to experiment along similar lines. Other trials were made later by different nations, and at the time of the Franco-German war, 1870–1, the defenders of Paris used the electric light, not only for illumination, but as a means of telegraphic communication by flash signals. The light was also used by the German invaders. In 1871, too, electric lights with lenticular projectors were tried in the Russian navy.

The introduction of the Gramme and the Siemens dynamo machines had no sooner been effected than a fresh start was taken in this field as in others. Since 1870 nearly every government of the civilized world has invested freely in electric lighting plant for warlike purposes. The Russian navy soon substituted Gramme machines for the old Alliance magneto-electric machines. During the Turco-Russian war electric light apparatus was given a very successful test on the Black Sea by the Russians. The British naval authorities have long been assiduously experimenting, and now every new British man-of-war has its electric light outfit. It is stated that in 1881 a Paris firm sold to the French Government no fewer than forty Mangin projectors, with electric light plant, for fortifications and coast defenses, and the late French operations in Tunis and Tonquin have been considerably furthered by the use of the light in night attacks and as a preventive against surprise. In fact, the attention of military engineers is actively occupied with the utilization of the many opportunities presented by this illuminant.

We illustrate on this page, by reproduction from *La Lumière Electrique*, a rather novel and ingenious application of the electric light, made by the British forces at Suakin, in Egypt. The attempts of England to suppress the Mahdi and his wild followers in the Soudan, are too well known to need recapitulation. The scene depicted is a striking instance of the triumph of science over superstition. Though the effect was but temporary, the end sought was gained. The town of Suakin had been surrounded by rebels from the outbreak of the insurrection. Arab tribes had swarmed down upon the flat surrounding country, and from their camps beneath the palm trees they harassed the timid Egyptian soldiery, over whom the English officers had little real control. In order to prevent a surprise, the besieged had to adopt the most careful measures, and one of these was the use of the electric light. In the heart of the works protecting the town, two quadrangular structures were built, and at the top of each a powerful regulator was placed, with all the necessary apparatus for the projection of the light athwart the environs.

It was noticed one evening that preparations were making for the long-expected night attack. The troops were at once put in readiness, but the chief reliance of the officers was in the light towers, rising above the ramparts, and dominating the plain across which the attacking bands would advance. Darkness fell, and the Arabs came on in hordes, shouting when they arrived within a few hundred yards of the walls, firing their guns at random, and waving their spears defiantly. At the right moment, the electric light plant was put in motion, the long beams of dazzling white light shot out suddenly upon the howling, rushing mass of Arabs, and in a few seconds the attack had by this means been turned into one of the strangest routs imaginable. The scene was worthy of Doré's pencil, and its weird spirit has been admirable caught by the artist whose sketch we give.

A NIGHT ATTACK FRUSTRATED AT SUAKIN, EGYPT, BY THE ELECTRIC LIGHT.

Electrolysis of Sulphuric Acid in Accumulators.

Some time ago, states the London *Electrician*, Professor Frankland suggested that in charging and discharging accumulators hexabasic sulphuric acid was electrolyzed. Dr. Gladstone and Mr. Tribe have carried out some experiments in this direction with sulphuric acid of a strength of 4.2 per cent. Their apparatus consisted of a U tube having a stop-cock in the centre of the horizontal portion. The hole in the stop-cock was so packed with asbestos as to prevent mechanical mixing of the liquids in the two arms of the tube or endosmose. With currents of different strengths they noticed that the increase of sulphuric acid in the positive compartment per equivalent of hydrogen set free decreased with the lowering of the current strength. In other experiments with sulphate of copper in one arm and sulphuric acid in the other, they found that the acid accumulated was largely in excess of the copper deposited, this being due to the unequal transference of the ions. From these results and those obtained by other experimenters, they conclude that the electrolytic method is incapable of determining whether dilute sulphuric acid, H_2SO_4, or a hydrate thereof, gives rise to the current; and moreover, from other experiments with copper and zinc sulphates, in which both arms of the U tube were filled with the same solution, they show that neither the composition nor even presence of a hydrated salt in aqueous solution can be determined by this method.

The History of Photometry.*

Photometry is a subject which has developed with the electric light. Formerly it did not appear to offer any great difficulties, and it has consequently been treated somewhat superficially in our text books of science. For the electrician photometry has a twofold importance; the function of the photometer is, first, to show what quantity of light a certain lamp supplies, so that its economy may be judged; and, secondly, to demonstrate the relations between the light produced and the other forces at work in a given system of machines and lamps. It was only when this latter point became better understood that photometers began to engage the attention of the electrician.

The first photometric tests referred to in text books of science generally, are those of Fizeau and Foucault, of 1843. It must, however, be borne in mind, that what these eminent French scientists originally measured is not that which really interests us at present in such experiments; the decomposition of an iodine and silver combination, by means of light from various sources, indicated the chemical intensity of the rays, but not the optical intensity. The surprisingly low chemical intensity of the limelight caused MM. Fizeau and Foucault to repeat their experiments, in order to determine the optical energy; and the agreement of the new and old figures suggested to them that, for white light, the two determinations might practically be replaced by the one which is more convenient, that is the chemical test. It is evident, however, and needs no further support in these days, when we photograph the invisible ultra violet spectrum that chemical tests cannot be relied upon, and that photometers like Becquerel's electro-chemical actinometer, or Siemens' selenphotometer, cannot measure the illuminative power of a source of light, however perfect and ingenious they may be in other respects. We have still to depend upon the physiological action of the light rays upon the retina of our eye, untrustworthy as this may be, since different observers are not equally sensitive to the same degree, and even the same observer is not so at all times,

The photometrical researches of Th. W. Casselmann, of Marburg, are of interest for the electrician, because they included the electric light, because they were prior to those of Fizeau and Foucault, and because in them there was first introduced Bunsen's photometer, in favor of which Casselmann decided against Ritchie and Rumford.

No accurate tests appear to have taken place after that before 1855, when MM. Lacassagne and Thiers tried their electric lamps at Lyons. M. Edmond Becquerel reported on those trials to the Société d'Encouragement of Paris, and this report led to a contest between the interested parties, as Becquerel estimated the intensity at 350 candles, while the manufacturers claimed 600 and more. This contest was of importance, because the real point was the question of expense. Scarcely any tests of real scientific value were however, undertaken before the Alliance magneto-electric machines in France, and those of Mr. Holmes and others in England attracted attention. Then difficulties cropped up everywhere, and the main problem has not been solved up to the present day. Neither the French bec-carcel, nor the English standard candle, nor the German candle, can be considered as normal, as they are all variable; this is strikingly evidenced by the fact that the ratios between the different standards, as stated in handbooks, do not agree. Many proposals have been made. MM. Rüdorff and Methuen suggested that the middle part of a flame, as more steady than the flickering top and the lower zones, ought to be observed; Mr. Vernon Harcourt and others proposed to burn mixtures of air and normal gases, and the former gentleman exhibited a neat normal lamp of about three-candle power, at the Southport meeting of the British Association. But these devices were mostly too delicate and complicated, and Mr. Louis Schwendler, one of the many electricians whose deaths we have lately had to lament, perhaps made the most practical suggestion in once more drawing attention to Mr. J. W. Draper's idea of using a fine platinum wire, heated by a constant current. Schwendler's units are sheet platinum horseshoes of .017 millimetre thick; but these again are open to objections, as we shall find. If we return to our historical abstract we find M. Tresca, in 1876, experimenting with a Foucault photometer, a modification of Rumford's instrument, which is largely employed in France, and comprises a milk glass disc, whose two halves are illuminated by the lamp to be examined and the standard candle respectively. Tresca experienced difficulty from the different colors of the lights, and interposed tinted glasses before them. Very instructive were the tests at the South Foreland lighthouses, conducted by Messr. Tyndall and Douglass, and fully described in the Trinity House Report, 1876-77. The electric lights were compared to a powerful colza-oil lamp, kept as nearly as possible constant at 722 standard candles; this comparison was effected by a Bunsen photometer, the colza lamp being again controlled with the help of a Sugg photometer. As the arc itself emits very little light while the greater part comes from the negative carbon, and a smaller amount from the positive, the necessity arose of taking, even with the two carbons vertically above one another, observations in various horizontal planes; M. Allard has further pointed out that even the various points of the vertical plane of the normal candle do not receive equal quantities of light. The report on his very extensive tests at the French lighthouses to the French Ministry ("Mémoire sur les Phares Electriques"), Paris, 1881, forms a very valuable contribution to the literature on photometry. M. Fontaine's observations on the Gramme machines and Serrin lamps, described in his "Eclairage Electrique," 2d edition, 1879, also deserve mention for their completeness. Both MM. Allard and Fontaine used Foucault's photometer, and suggested ways to arrive at mean values with very unsteady lamps; these proposals are, however, hardly of practical weight, nor could M. Allard's idea of verifying his figures, with the help of a Crooke's radiometer, contribute much to their corroboration, as this comes scarcely within the functions of a radiometer. Foucault's photometer was likewise employed when MM. Sautter, Lemmonier & Co., of Paris, were testing their photo-electric apparatus, for military operations, the lamps being supplied with Colonel Mangin's aplanatic reflector; green glasses were also, in this case, interposed to equalize the colors.

A similar arrangement was adopted at Rouen in 1881, when, on behalf of the Société Industrielle, the systems of Jablochkoff, Gramme and Siemens were subjected to a series of comparative tests. Here, again, a Foucault photometer was used, together with the ordinary bec-carcel and the silvered glass mirror to make the rays parallel. The loss from reflection was averaged at 30 per cent.; the observations were made at various distances, and a determination was made of the radius of that horizontal plane, which received the same quantity of light as a normal candle could supply at a distance of about 4 m. This was a step in the right direction; the report, "Rapport general sur l'Eclairage Electrique des Quais de Rouen," 1881, shows curves drawn to indicate by their ordinates the light falling upon the horizontal plane.

The municipality of Paris has for some years instituted annual tests of the Jablochkoff candles in the Avenue de l'Opéra, which tests finally induced them to abandon those apparatus. The Jablochkoff candles shed their maximum illumination, of course, in the plane perpendicular to the line drawn through both candles; the minimum in this line was found to be 0.57 of the maximum; the mean intensity, however—not the mean between maximum and minimum—was equal to .9 of the maximum, as the intensity curve proved to be of the shape of a figure 8, and not an ellipsis. It also transpired that the air was less transparent to the red light of the Jablochkoff candles than to the gas rays.

The well-known experiments at Chatham of 1879 and 1880 ought to have been mentioned before this. The apparatus comprised a Rumford photometer and an Argand burner of 40 candle-power, with a Sugg's regulator. Photographs were taken at the same moment of the front and sides of the carbons, and the illuminated areas calculated from these photographs. The average illumination of a point was further derived from these calculations under the questionable assumption that the light was evenly distributed over the whole plane.

We have already spoken of the difficulty which was met with in comparing lights of different colors. The method of action of the ether vibrations, which excite our optic nerves and create the sensation of sight, is unknown to us; but we know that this function depends upon the wave lengths of the rays. M. Purkinje has shown that two colored planes which appear equally light at a certain distance, seem to lose their light in a different ratio if further removed from the eye. Two lights of different color are therefore incommensurable. Mr. Dietrich has recently, with more perfect apparatus, repeated the tests by means of which Fraunhofer attempted to determine the illuminative power of various parts of the spectrum, whose lines he so assiduously studied and noted, without in the least conceiving their character and importance. Fraunhofer had only an oil-lamp at his disposal, and, just as we should expect, he was wrong by about 9 per cent. with reference to the rays from the line *D* in the yellow, as here the two lights were most homogeneous, but wrong by 60 per cent. when analyzing the rays from lines *B*, *G* and *H*. Spectrophotometric observations, such as first proposed by Vierordt, Glan and others, may be perfected to a high degree of comparative accuracy; if we arrange the two spectra to be compared, above one another, and divide both by vertical lines into bands of one and the same tint, we may achieve very exact measurements. But this can only be executed in the laboratory, and not in ordinary practice, while, after all, it yields only comparative values for the various colors.

Tinted glasses have often been employed to produce rays of equal color; but such interposition means loss. Captain Abney conceived the interesting idea of watching lights through a photographically prepared glass plate with a scale of darker and darker bands, through the darkest of which even the sun was not visible. But in the dark the eye gets slowly capable of distinguishing details which were at first quite indiscernible. Further researches, therefore, convinced Captain Abney that the ratio between red and blue in the same electric lamp, varied very considerably as the speed of the generator increased, so that the red rays, which originally were half as strong as the blue ones, finally possessed only one-fourth of the intensity of the blue ones, both, of course, increasing in intensity with the quicker revolutions. Professors Ayrton and Perry followed Captain Abney in making two series of tests, choosing, however, red and green lights, instead of red and blue. The difficulty remains, however, how really to compare and reduce to unit measurements those two rows of figures. M. Crova (Comptes Rend. xciii., p. 512) went one step further in this direction. He watched the two half-discs of a Foucault photometer by means of two Nicol prisms, with their main section vertical to one another, and between the pivots he put a quartz plate of 9 millimetres thickness. If the two lamps are placed in their proper positions both discs appear of a greenish-white tint, and may then easily be adjusted until equal illumination is attained. The theory of this apparatus is too complicated to be discussed here; the main point is that the quartz is designed to produce two broad interference bands toward the ends of the spectra; in the middle parts the intensity of the rays varies, but there must be one line at which the rays pass through the pivots without becoming weakened. This maximum of illumination is now, by adjusting the second pivot, to be fixed at those rays whose comparison would yield the same result as that of the total intensities. The apparatus is ingenious, but in seeking for the districts of equal illumination in the two spectra, it presumes that the spectrophotometer received equal amounts of light from both sources, which anticipates the solution of the problem.

The newer photometers of both M. Cornu and Professors Ayrton and Perry permit measurements of strong electric lamps being taken in small rooms without the awkward necessity of removing powerful lamps to great distances to bring them into comparison with the standard candle. M. Cornu intercalates between the rays of both lights an achromatic lens whose active aperture may be widened or lessened with a micrometer screw, and thus varies the quantity of light falling upon the photometer. Apparatus of this kind has often been thought of; the star photometers of Steinheil and Herschel are based upon the same principle. Messrs. Ayrton and Perry, in their dispersion photometer, use a concave lens to decrease the intensity of the rays. No loss of light was supposed to occur through absorption in this concave lens if it were only thin enough; Mr. Voller, of Hamburg, has, however, taken exception to this assumption, and pronounced the possibility of losses of 10 per cent., and Messrs. Ayrton and Perry seem after to have silently admitted this source of error by introducing a plane parallel glass plate between the screen and the standard candle to weaken the intensity of the light standard. The losses through absorption in the air, Professors Ayrton and Perry observed to be strongest for green light. MM. Bouquer and Allard have further investigated the phenomena of absorption in air; the coefficients vary greatly with the conditions of the air, but they are sufficiently determined to show that in tests where the strong lamp is 50 metres distant from the screen, a loss of about 4 per cent. has to be taken into consideration.

We have finally to speak of the labors of the third section of the Congress at Paris in 1881. The candle found practically no advocate, although Dr. Werner Siemens declared that a good candle need not vary by more than 5 per cent. MM. Tochikoleff and Bède stood up for Schwendler's platinum unit, but M. Crova objected, because platinum had no molecular structure, and consequently no constant emissive power; small differences of temperature would further lead to inexact figures. M. Violle recommended the use, as a unit, of the quantity of light radiated by one square centimetre of platinum at melting point. MM. Werner Siemens and Cornu assented, but preferred silver. Sir William Siemens proposed an iridium wire under the influence of the unit of current. MM. Neujean and Flamache caused slight surprise by praising the magnesium and lime lights. For want of anything better, the old bec-carcel was finally left in office, although M. J. Dumas pronounced it too weak. The discussions on photometers were less warm. M. Bergè made the curious proposal to remove the lamp until a white screen would no longer be visible through a solution of the sulphate of copper ammonia. The great problem of what to do with reference to the various colors also remained unsettled. M. Allard suggested the creation of a blinking effect, as then all colors would dissolve into one uniform gray, and Dr. Gladstone proposed the employment of long distances across which the differences of colors would disappear. The proposal of M. Rousseau that for each lamp the equation of the intensity curve $J=f(a)$ should be calculated, was warmly supported and accepted.

* Abstract in *Engineering* of the report of the Scientific Commission at the Münich Electrical Exhibition.

How a Contract was Lost.—The following little story is told by the *Iron Trade Review:* The telegraph is a great convenience to manufacturers, but occasionally it leaves them in the lurch. Recently the Standard Rivet Co., of Cleveland, lost a 40-ton contract by the simple failure of the telegraph company to deliver a message. The Pittsburgh Bridge Co., it appears, went into the market for 40 tons of rivets. The Cleveland company wanted to bid, but telegraphed, asking a two days' delay. Meantime they mailed a bid that would have taken the contract, but for the fact that the telegram was never received by the Pittsburgh parties. The consequence was that, being in a hurry and not being advised of the proposed Cleveland bid, they let the contract to other parties at higher figures; thus both sides were "out." We understand the telegraph company is to be held to account for its negligence.

Hatching by Electricity.

The poultry of to-day are not the birds their ancestors were. They have risen in the social scale, owing to a well-sustained process of artificial selection exerted by man and not less effective for improvement than any natural evolution and survival of which philosophers tell us. One of the most popular hobbies of the present day is poultry raising, and of all the various kinds of hobbies, we know of none more excusable and commendable than this, since none of the ruling passions so deserve our praise or win our sanction as those which concern the collection and betterment of things useful and beautiful, especially living things. As Coleridge put it, "He prayeth best who loveth best, all things both great and small," and one who works in harmony with the tendency of Nature, by seeking to improve any of the under animals, has no reason to be ashamed of the pursuits to which his idiosyncrasies incline him. Poultry raising is a laudable hobby then, but it is also one of the most important industries of this country, representing a sum of not less than six hundred million dollars. We should judge from the present price of eggs and chickens that few industries are more profitable. It is to the combined efforts of those who breed fine poultry for the sake of improving the strain and those who breed it in order to get the best market that the superiority of the poultry of the present time over its predecessors is due.

All enterprising breeders and successful poultrymen have arrived at the conclusion that a good incubator is an imperative necessity to the business, and incubators are becoming so common that the hens will have to join the protection party, or ask for legislation of a prohibitory or anti-Chinese character. The hen is an unreliable bird, and when wanted to set has very often something else to do. The chief element heretofore in favor of the hen has been the difficulty in obtaining any hatching apparatus more reliable than she. It has taken a long time to find that desideratum. The old Egyptians hatched eggs by artificial warmth, and prior to our own Revolution the Parisian market was supplied by a man named Bonnemain, with excellent poultry, reared artificially, at a time of year when the farmers had none to sell. At the present time, there are probably at least thirty incubators offering in this country, some of which have long been known. But hitherto, the poultrymen of all ages and nationalities have failed to get incubators that furnish uniform and continuous moist heat. Under these circumstances, we avail ourselves of the opportunity of describing and illustrating a system of incubation in which electricity plays a prominent part. We refer to the machine, shown on this page, of the Perfect Hatcher Company, of Elmira, N. Y., who, by the application of the electric current, have, we think, made an incubator perform all and more than a setting hen can do, for the vivifying egg.

Regulators that regulate are very rare, and it is not strange, therefore, that in incubators with mechanical contrivances failure has been experienced to a discouraging extent. With electricity actuating an automatic device, regulation becomes more nearly perfect than under any other conditions, and the company named claim to have succeeded in producing a regulator that is "positively reliable always," compared with which the ordinary hen is what Addison in *The Spectator* once called her, "a very idiot." It has the support of hundreds of warm recommendations.

Fig. 1 shows the Perfect Hatcher No. 2, with automatic regulator fitted. The regulating screws are on the right hand; the clock-work and lever connected with the lamp are on the left; in the centre is the battery; in front is the ventilator. The application of heat in this incubator is by means of hot water from the galvanized iron tank shown outside, and the heat is deflected from the tank to the top of the eggs, giving them warmth in the same manner as it is applied by the hen. When the heat in the egg chamber reaches 104°, the left regulating screw is turned up until it strikes the lever above, thereby completing the circuit. The magnet pulls down the armature, releasing the clock work, which moves instantly, opens the ventilator, and turns down the lamp flame at the tank. The temperature is thus kept down by allowing the hot air to escape and by checking the heat at its source. When the heat falls one-fourth of a degree, the other regulating screw is turned until it strikes the lever as before, when the opposite circuit is completed. The ventilators close again and the lamp flame is turned up. This action occurs every five to fifteen minutes, and will go on indefinitely after the first regulation. There are thus two circuits, one to open and the other to close the ventilators, and as the operation of the clockwork is instantaneous, the consumption of battery power is minimized. It is stated that the cells used with the hatcher last, without renewing, for two years. A recent important improvement is an alarm-bell attachment, with extra thermostat, battery and alarm.

A word as to the hatcher itself will not be out of place. The cut given is of a No. 2 machine. Both sides are alike. It has four glass doors, eight egg drawers, four lower doors that open into the nursery beneath, and a ventilator in each of these lower doors. When the top ventilator opens, the air rushes in at these bottom ventilators and is warmed in passing over these hot pipes. The application of moisture is by means of open pans of water placed on the hot water pipes, and just enough evaporation goes on to overcome the dry heat and soften the air in the egg chamber above. The chamber is large, and fourteen inches in depth. By a system of drawers several batches at various stages of maturity can be hatching at the same time, and what Emerson describes as the "sweet genesis of things" can be closely watched from day to day. The case of the hatcher is made of wood thoroughly kiln-dried and combined with paper and dead air space of one inch enveloping the entire machine. There is a circulatory system of pipes from the tank for the hot water. The time required to run the whole apparatus is only about ten minutes in the morning and ten at night, at a cost for the largest size of about ten cents a day.

The regulator, see Fig. 2, is also of great service in maintaining a proper degree of furnace heat in the house, and its operation can be clearly followed in connection with Fig. 3. The thermostat is seen on the left and the clock and valve on the right in Fig. 2. The thermostat is hung on the wall of any of the living rooms, see *A*, Fig. 3, while the clockwork and valve are placed on a branch of the smoke-pipe of the furnace, as seen at *E*, *F*. In regulating primarily, when the temperature of the room is at the desired point, as indicated by the thermometer, the regulating screw *I*, in Fig. 2, is turned until its point comes in contact with the thermostatic bar *G*. This closes the electric circuit to *C*, in Fig. 3. The clockwork is set in motion, and the valve *F* of the branch pipe is opened. The draft of the chimney is checked, as the draft is through the valve instead of the furnace. Consumption of fuel is lessened and the temperature of the room gradually declines. When the temperature has fallen one degree, the other regulating screw *E* is turned until its point comes in contact with the bar *G*, at which instant the electric circuit is closed again. Once more the clockwork is started, the valve *F* is closed and the fire burns up anew.

If necessary, in case of a weak draft, a front attachment can be introduced, as seen in Fig. 3 at *B G H*. The damper *H* closes when valve *F* opens, and *vice versa*. The thermostat having been once adjusted, as above, it does not need to be touched throughout the season, unless a change of heat is wanted owing to the unusual mildness or severity of the weather. The thermostatic bar is peculiarly sensitive and responds quickly to the variations of heat in the room where it is placed. The thermostat itself is 2½ in. wide and 11 in. long, and is of handsome appearance, suited to any style of apartment. There is a switch on it, *H*, by means of which a lower temperature can be obtained at night.

Our illustrations give an excellent idea of the working of the regulator with either the hatcher or the furnace. We learn that the hatcher will be on exhibition at the Cincinnati Exposition in September, when not only chickens, but alligators, turtles and snakes will be hatched out, and when a brooding-house will be on view with 2,000 poultry. A special building is to be constructed there for twelve Perfect Hatchers having a capacity of 11,520 eggs, and fifty Queen Broooders hovering 5,000 chicks.

Our readers will be able to see the hatcher in operation at the International Electrical Exhibition at Philadelphia.

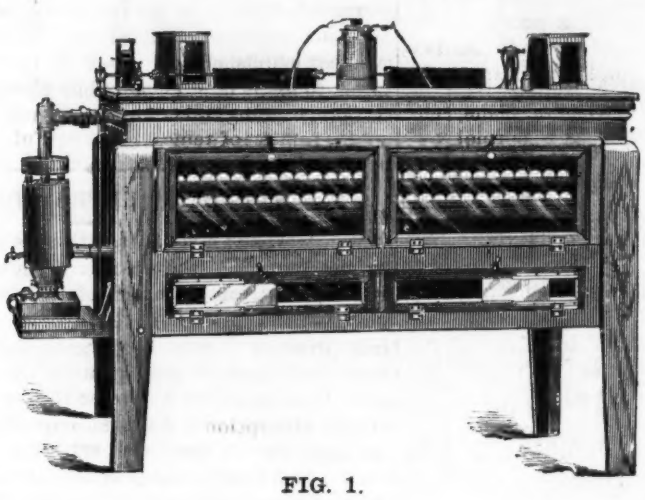

FIG. 1.

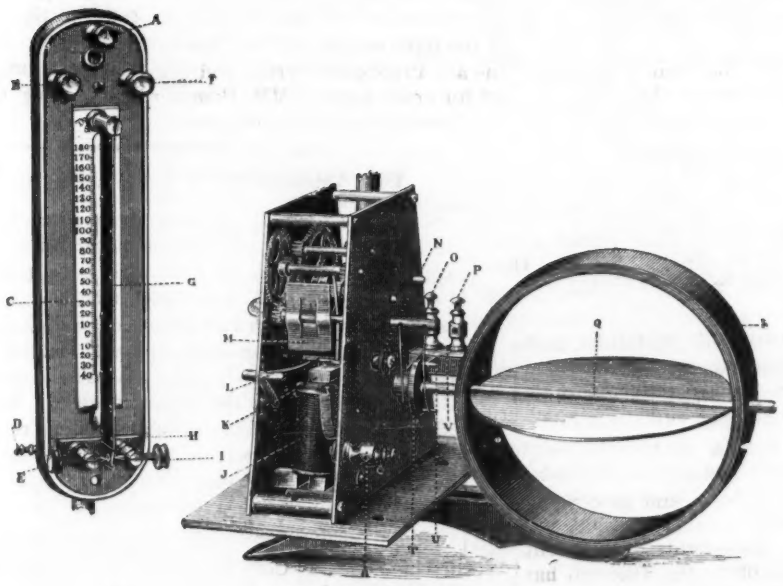

FIG. 2.

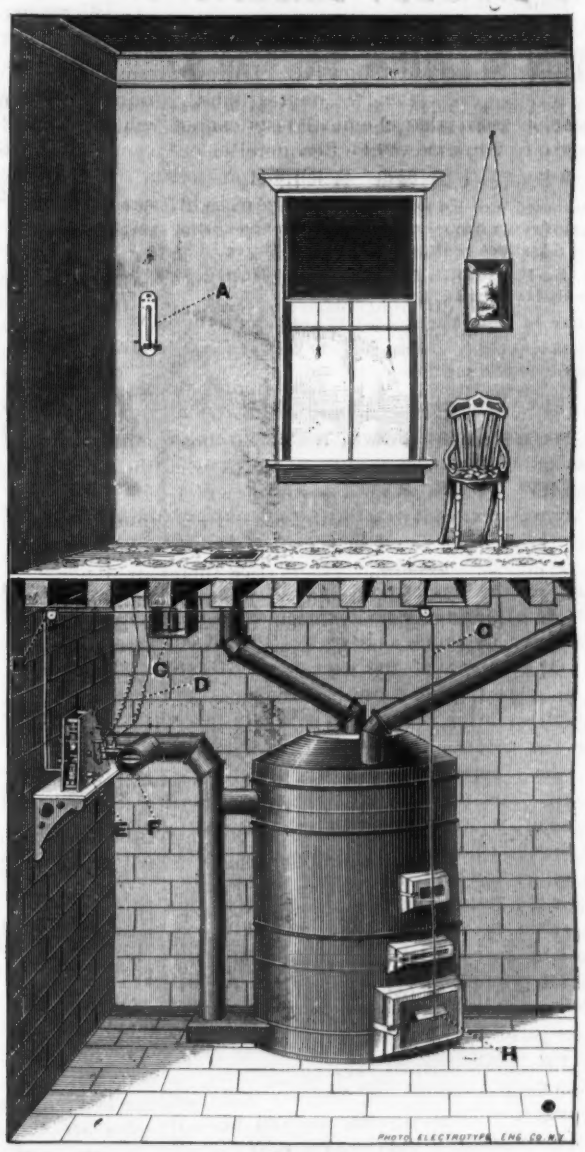

FIG. 3.

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PATENTS IN ENGLAND.

The working of the new patent law in England is of much interest to American inventors, hundreds of whom seek to profit there as much as here by their discoveries and devices. The report of the Comptroller-General of Patents, just published, gives some particulars on the subject, from which we infer that the law is still susceptible of change for the better. It appears that the number of applications for patents received under the act during the first four months of the present year was far in excess of what was expected, reaching 7,060 against 5,993 for the whole of 1883 and 6,241 for 1882. The statement is made, however, that only 91 patents were "sealed" under the Act during the four months, but this may be explainable by the fact that only 612 complete specifications had been accepted in the same time, together with 5,256 provisional specifications. At this rate, the English Patent Office will now deal with about 21,000 applications for patents per annum, a figure still falling greatly below the 34,576 dealt with by the U. S. Office. It is evidently too early to pronounce on the possible number of patents granted, or "sealed."

Much dissatisfaction arises naturally from the refusal of the English officials to allow under the same patent a claim to a combination of parts as well as a separate claim to one of those parts that can be used advantageously in some other arrangement or combination. The result is said to be that in some instances, where only a provisional specification has been filed, the applicant is required to state what he proposes to claim, with the object of enabling an examiner to determine whether he ought to report or not that the specification contains more than one invention. This cannot but be embarrassing to an inventor at times, and especially when he has to deal with incompetent examiners. It may not merely delay him, but even expose his rights to attack and injury.

The significant statement is made that of the total number of applications, 5,093, or 72 per cent., were made by agents, and 1,967, or 28 per cent., direct. No matter how simple and clear a patent law may be, the inventor will always have need of an expert to guide his case through the various stages until a patent is secured on the broadest and most favorable claims. In order to get a good patent here or elsewhere, a man requires to be versed in patent law, to know something of the general principles involved in several thousand patents, to be acquainted with the state of the art, and to be a good chemist, mechanician and draughtsman. Few inventors are so variously gifted as this, and in consequence the business of procuring patents must always belong to experts who devote their lifetime to it. Under the operation of the plainest law, the uninstructed and unadvised inventor will get involved in a great many costly difficulties if he does his own experting, and he will generally obtain from the Patent Office an unsatisfactory patent, not likely to withstand severe tests. We should imagine that at the present time in England, with a patent law so lately amended, the services of the expert are peculiarly valuable and practically indispensable.

LIGHT FROM LITTLE LUMPS OF JELLY.

We remarked last week that the electric light, the latest and most perfect artificial light known, was likely to remain without a rival for a while. But we reckoned without our host. Prof. M. Williams says that Prof. Radziszewski has contrived to separate the luminous matter of the *Pelagia noctiluca*, delicate marine animals that appear like little lumps of jelly and produce the familiar phosphorescence of the sea. The latter gentlemen evaporated 180 of these little creatures, and out of the residue he dissolved with ether a remarkable kind of fat, which, mixed with potassa, gives out, when shaken, phosphorescent flashes.

Now, says Prof. Williams: "The practical importance which I attach to the study of the luminosity of these creatures is the fact that they supply light without heat. The costliness of all our present methods of illumination is due to the fact that we waste a large, disproportionate amount of energy in producing heat as well as light." The deduction is inevitable: "This wastefulness may be illustrated by supposing that we obtain a pound of the phosphorescent fat of the noctiluca, and divide it into two equal parts, making one-half into candles to burn in the ordinary manner, and using the other half to give out its light by cold phosphorescence. I am not able to give precise figures, but believe I am well within the truth in estimating that the candle would dissipate 95 per cent. of the potential energy of the fat in the form of heat, giving but 5 per cent. of the amount of light that the other half pound would emit as cool phosphorescence. Let us, then, hope that Professor Radziszewski will continue his researches, and discover the whole secret of both the analysis and synthesis of this fat; and that of the glow-worms, the fire-flies, etc. Now that we can supply the confectioner with flavors of almonds, raspberries, jargonelle pears, nectarines, etc., and imitate the perfumes and the richest colors of nature's sweetest and brightest flowers, all by the chemical manipulation of coal tar, we need not despair of solving the chemical problem of transforming mutton suet or palm oil or vaseline into glow-worm or noctiluca fat, to be used for illuminating purposes."

Here lies the germ of a great scheme, and we tremble for the future of the electric light, should not the Berghs and other protectors of animal life interfere. Of course, Prof. Radziszewski would not stop short at glow-worm grease or noctiluca fat. There is a hint for him in that pathetic passage by Carlyle on Robert Burns, as a heroic man of letters: "Richter says, in the Island of Sumatra there is a kind of light-chafer, large fireflies, which people stick upon spits, and illuminate the ways with at night. Persons of condition can thus travel with a pleasant radiance, which they much admire. Great honor to the fireflies. But—!" In the tropics, as the present writer has often seen, people will read by the light of a firefly or two, of the tribe *Elaterides*, under an inverted tumbler, and fair women will weave them into their hair or dresses for the ball. Why not experiment on firefly fat too? It is also said that these luminous creatures can give shocks. If that be so, their fat might be worked up into medical batteries, while electric eels could be ground or macerated into a paste and incorporated in dynamos so as to add materially to their capacity. Last, but not least, the experiments might be tried with animals raised for the purpose on the soil of the State of Georgia, from which now come so many wonderful magnetic girls, and the world at large might be a gainer if a few of those girls were vivisected in order to see if their fat is like that of the electric eel, the firefly or the little luminous denizens of the deep. Great discoveries may hinge on such an investigation.

Seriously, we think that Profs. Williams and Radziszewski are searching after light in a rather clumsy way, and that, though their work is of a most interesting character, they may as well rest satisfied with the *unheating* electric light for purposes of illumination.

CABLE CORRESPONDENCE.

The increase in the number of Atlantic cables, between this continent and the western shores of Europe, is likely to have a direct effect in leading more of the great daily papers of the country to indulge in cable correspondence from their representatives abroad. It is well known that many papers are awaiting with lively interest the completion of the Commercial cables, when they hope by means of low rates to fill their columns to a greater extent than ever with the latest foreign intelligence of their own collecting. We trust heartily that their wishes may not be disappointed, and there is little doubt that these papers will be benefited in the matter of rates. But we cannot refrain from expressing the hope that a more extensive use of the cables will be accompanied by an improvement in the manner and substance of the news transmitted. The correspondents could be better employed than in sweeping up the chaff from the threshing floors of European scandal; but, to judge from the frequent sorry exhibitions in the Sunday papers, some of them do not rise above backstair gossip, the canards of the clubs, and anecdotes from behind the scenes. Perhaps one ought not to expect every busy correspondent to be able to pen and cable letters that will hereafter be valuable to the students of history, but no harm will come of placing the standard high.

If we were asked to specify a first-class piece of cable correspondence, we should point unhesitatingly to the five-column dispatch that appeared in the New York *Times* last Sunday, from its correspondent, Mr. Harold Frederic, who, after spending nearly a week at Toulon and Marseilles, furnished the American public, by cable from the latter place, with the first clear idea of the actual situation in those cholera-stricken cities. We rank that letter as one of the finest journalistic performances of the day, equal in its line to the most widely celebrated achievements of Russell, Forbes, MacGahan or Stanley. Taking his life in his hand, Mr. Frederic went down into the midst of the horrible scenes of plague and suffering in Southern France, and then, with graphic style and an infinity of faithful little touches, told us by cable what he had seen. The work was done bravely and was "done to the quick." Heroism to perform, and ability to describe, of this nature, elevate the profession of journalism; and the dispatch, with its brief supplement, must be regarded as one of the most notable newspaper feats of the year, highly creditable to the writer of it and the journal that published it. Used in this way, by a master hand, to assist in allaying public alarm, and in stimulating to public sanitation, electric science as displayed in the cables fulfills its noblest end.

WORTH AN EXTRA POLICEMAN.

Municipal and civic authorities are gradually waking up to the fact that the electric light can be made a very effective instrument in aid of the police, and it is noticeable that the papers, as exhibited by our extracts to-day from those of Boston, are urging the superiority of electricity over gas, on like grounds. At the meeting of the New York Board of Aldermen this week, a large number of resolutions were adopted, requesting the Commission for Lighting the Streets to substitute the electrical light for gas in a large number of streets in this city, including most of those leading to the ferries. The Aldermen nearly went so far as passing a resolution providing for the use of the electric light on "all the principal streets as far as possible," and one of them quoted the Superintendent of Police to the effect that every electric light is worth an extra policeman. Greatly as we esteem "the finest," we would rather see more electric lamps put up than additions made to the force.

The Application of Electricity to Weaving.

The late Comte T. du Moncel contributed an interesting article on this subject to the paper with which he was connected, and an abstract has been published in the "Abstracts of Papers in Foreign Transactions," etc., published by the English Institution of Civil Engineers, as follows: "Of the various applications of electricity, none have progressed more slowly than that which was made nearly thirty years ago in the weaving shed. The journals of 1855 and 1856 were full of the marvellous results furnished by this application, which was to supersede the Jacquard looms by substituting electric interrupters for the Jacquard cards. The author first deals with the Bonelli system, and to make his description clear, he explains the principle of the Jacquard loom. In the Bonelli system, the lower part of the Jacquard loom is maintained, but the crotchets are terminated in an iron head, resting on a tringle or bar of wood connected to the pedal. This tringle—or these tringles, for there are several—are, by the pedal, raised to the height of one or several series of straight electro-magnets in number equal to the crotchets. A metallic cylinder, or an endless metallic cloth working on two cylinders together with a series of points communicating with the electro-magnets, constitute the means of making and interrupting contact and controlling the displacement of the crotchets. The design is traced in insulating parts and in conducting parts on the cloth or cylinder, and such an arrangement for only two colors is extremely simple, but for more highly-charged designs, such as cashmeres, Bonelli constructed a special transmitting apparatus. This is composed of two parts, a grated composing frame and a comb with movable teeth. There is also a frame in which are ranged, according to the different shades of colors and the space these should occupy, small pieces of metal of different lengths (varying according to the order of the colors) and of different widths (varying as to the space these should occupy on the design). These pieces are of the same thickness. Over them, constituting an unequal face, are passed the movable teeth of the comb. As the teeth of the comb are each in connection with one of the electro-magnets of the loom, at each movement of the pedal the crotchets related to each color are raised at the same time. In Maumene's system the electro-magnets are caused to act directly on the needles which in the ordinary Jacquard loom uphold the crotchets. By this arrangement the ordinary machine is preserved nearly intact. A cylindric commutator is employed. In Pascal and Mathieu's system a plate of copper that has received

the design is placed vertically and laterally with relation to the crotchets sustaining the threads. It turns on cylinder without total displacement. In Gand's system the electro-magnets act directly on the crotchet bars, and fixed conducting wires are substituted for the movable needles of the Jacquard loom, which are subject to frequent disarrangement. And instead of the Jacquard cards paper bands are employed placed over a polygonal frame. Regis's system is a modification of that of Gand. A later system by Bonelli discards the commutator, or rather substitutes an inverse arrangement, and instead of making a conducting surface insulating, an insulating surface is metallized. In the former case the insulating material wore away and clogged the contact brush. The designer draws on paper with the aid of a sticky varnish the pattern to be produced in the tissue. The design is then covered with a sheet of tinfoil, which is allowed to remain in contact for about half an hour. The paper is then rubbed with a cotton pad, the tin remaining adherent where the varnish is, and elsewhere disappearing. The author appeared to be of opinion that further valuable improvements are to be anticipated.

How to Produce a Rainbow.

Prof. Tyndall thus describes his successful reproduction, with the electric light, of rainbow effects as seen on Swiss mountains: The physical investigator desires not only to observe natural phenomena, but to recreate them —to bring them, that is, under the dominion of experiment. From observation we learn what nature is willing to reveal. In experimenting we place her in the witness-box, cross-examine her, and extract from her knowledge in excess of that which would or could be spontaneously given. Accordingly, on my return from Switzerland last October, I sought to reproduce in the laboratory the effects produced among the mountains. My first object, therefore, was to obtain artificially a mixture of fog and drizzle like that observed from the door of our cottage. A strong cylindrical copper boiler, sixteen inches high and twelve inches in diameter, was nearly filled with water, and heated by gas flames until steam of twenty pounds of pressure was produced. A valve at the top of the boiler was then opened, when the steam issued violently into the atmosphere, carrying droplets of water mechanically along with it, and condensing above to droplets of a similar kind. A fair imitation of the Alpine atmosphere was thus produced. After a few tentative experiments the luminous circle was brought into view, and, having once got hold of it, the next step was to enhance its intensity. Oil lamps, the lime light and the naked electric light were tried in succession, the source of rays being placed in one room, the boiler in another, while the observer stood with his back to the light between them. It is not, however, necessary to dwell upon these first experiments, surpassed as they were by the arrangements subsequently adopted. My mode of procedure is this: The electric light being placed in a camera with a condensing lens in front, the position of the lens was so fixed as to produce a beam sufficiently broad to clasp the whole of my head, and leave an aureole of light around it. It being desirable to lessen as much as possible the foreign light entering the eye, the beam was received upon a distant black surface, and it was easy to move the head until its shadow occupied the centre of the illuminated area. To secure the best effect it was found necessary to stand close to the boiler, so as to be immersed in the fog and drizzle. The fog, however, was soon discovered to be a mere nuisance. Instead of enhancing, it blurred the effect, and I therefore sought to abolish it Allowing the steam to issue for a few seconds from the boiler, on closing the valve the cloud rapidly melted away, leaving behind it a host of minute liquid spherules floating in the beam. A beautiful circular rainbow was instantly swept through the air in front of the observer. The primary bow was duly attended by its secondary, with the colors, as usual, reversed. The opening of the valve for a single second causes the bows to flash forth.

Annular Magnets.

BY PROF. A. K. EATON.

The possible conversion of a steel ring into a true bi-polar magnet has been questioned by many experimenters, and unquestionably the results obtained by them seemed to justify that conclusion. The writer, in connection with the construction of his new direct-reading voltmeters, ammeters, etc., in which he makes use of annular magnets, both for the containing field and for the needle, has necessarily made a study of the peculiar behavior of steel rings during the process of magnetization, and perhaps can throw some light on the occasion of the discrepancy in results produced by different individuals. A brief statement, illustrated by spectra of the rings in different stages of magnetization, will probably clean up the matter.

A ring of good steel throughout and properly tempered may be made to exhibit various magnetic phases, according to the treatment to which it is subjected, as is illustrated by the following spectra, showing the magnetic lines of force as they are developed by a given treatment.

If this ring be touched at any point by the south pole of a permanent magnet of moderate strength a north pole will immediately be developed at the point touched, but the opposite part of the ring remains apparently neutral. If, however, the magnet be retained for some little time in contact with the point, the ring begins to show a decided tendency to break up into several polar points. A spectrum of the partially magnetized ring taken at this stage of the experiment will exhibit lines of magnetic force, as represented in Fig. 1, the point of contact near *N* having

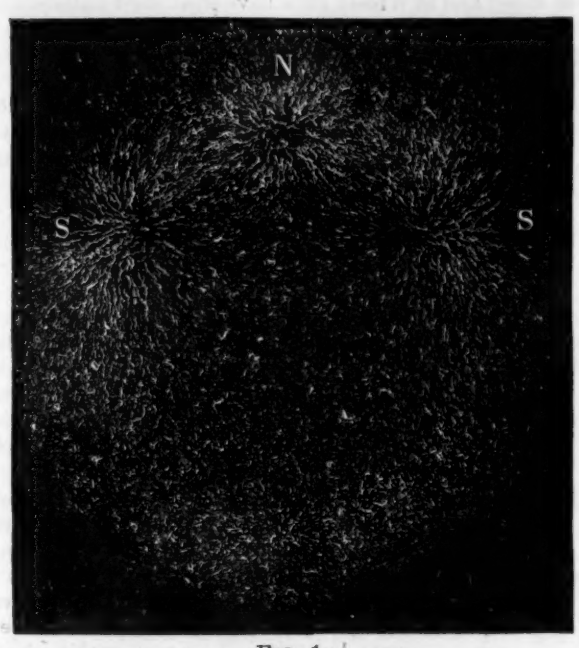


FIG. 1.

become a north pole and two south polar points *S S* having been developed 60° to the right and left of the north pole. It will be seen also that there is a faint devel-

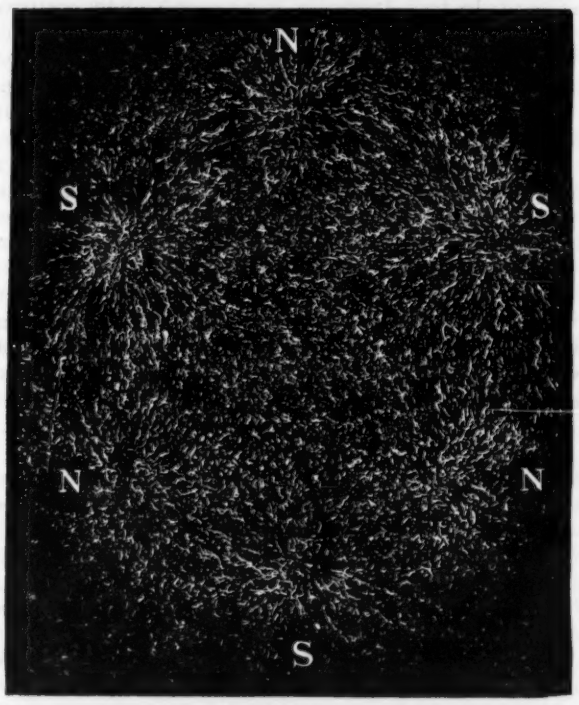


FIG. 2.

opment of another polar point directly opposite the north pole. If the magnet be retained for a considerable length of time at the point *N* there will be developed two other

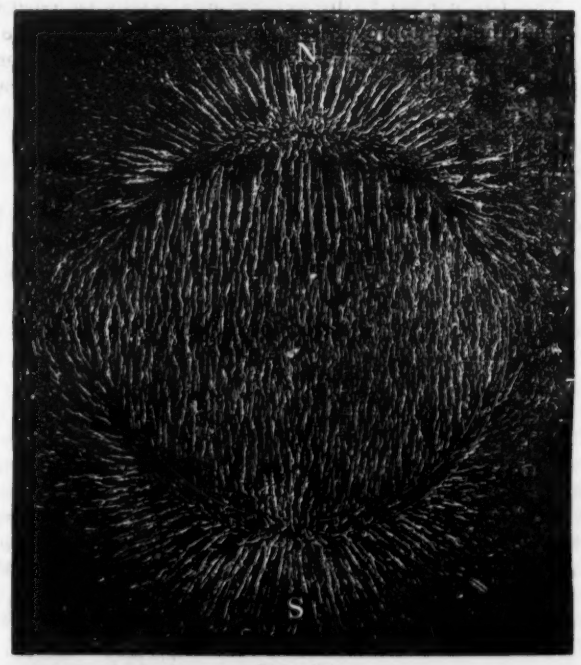


FIG. 3.

polar points, and the faint one of the former experiment becomes well defined. Fig. 2 shows the distribution of the magnetic lines of force at this stage of the experiment. Six polar points are distinctly shown. So long, however, as the charging magnet is applied to only one side of the ring, the polar points on the opposite part are more feebly defined than those of the half in direct contact with the magnet. To secure a perfectly uniform development of all the six polar points it is necessary to touch the point opposite to the north pole first formed with the north pole of the charging magnet; this secures uniformity in the spectral representation of the different parts of the ring. At this stage of the experiment the ring may be considered as divided into six magnets; but in this condition it is quite useless for my purpose, which calls for a true bi-polar magnet. It is difficult to bring the ring to this required condition by means of an ordinary permanent magnet unless it be an unusually strong one. It is easily effected, however, and quite simply by means of an electro-magnet. A simple straight helix, the iron core of which is of the same length as the diameter of the ring, charged by a proper current, with the iron touching opposite points of the ring, will magnetize the latter to saturation in a few moments. It then becomes a true bi-polar magnet and gives a spectrum, represented by Fig. 3. If the steel ring be quite homogeneous in its structure the lines of force within the ring will be all right lines and quite parallel to each other. It is by means of this magnet with a uniform containing field, acting upon an annular needle, having similar properties, that in the instruments referred to I obtain the desired results, *i. e.*, an annular needle within an annular field magnet gives an equal increase of deflection for an equal increment of electromotive force or of current strength. I am thus enabled to construct direct reading instruments, in which, if a deflection of one degree represents one volt, two degrees deflection will represent two volts, etc. By this combination the effect of terrestrial magnetism is practically eliminated, and the action of surrounding magnetic masses, if not excessive, neutralized.

Safety for Flour Mills.

At the first annual convention of the National Association of British and Irish millers, held at Stockton-on-Tees in June, a paper was read on "The Electric Light in Flour Mills," by J. H. Greenhill, and including the subject of insurance of flour mills. On the latter point there was evidently considerable feeling in favor of an association of millers for mill-insurance. On the subject of the electric light in mills the writer of the paper named went over a good deal of ground which it is unnecessary to follow—such as the methods of generating and conducting electric currents, and other elementary topics in connection therewith. With reference to the relative merits of the electric light compared with other means of artificial illumination the main question was rightly stated to be: "How does it compare with gas in cost?" Various considerations were taken into account in replying to this, such as, first: "What is the price of gas and its illuminating power?" and "What means are there for driving an electric light machine?" In discussing this question, which is a primary one in all discussions of the extent of the field for the electric light as against that of gas, the writer took the cost of gas at 2s. 6d. per 1,000 feet (about 63 cents, or less than one-third of the lowest average price of gas in the United States), and of 17-candle illuminating power. It was estimated that flour mills will require on the average 100 lights of 20-candle power each, or an aggregate of 2,000 candles. To obtain this light with gas it will take 595 feet per hour. The relative cost of the two methods of illumination is then given as follows :

Cost of which at 2s. 6d. per 1,000 feet	1s. 5¾d.
Cost of repairs to pipes and renewal of burners, £6 per annum, ¾d. per hour (2,000 hours)	0 0¾
Attendance, 5s. per week, £13 per annum, 1½d. per hour	0 1½
Interest on first cost, say £50 at 5 per cent, £2 10s	0 0¼
Cost of gas per hour	1s. 8½d.

about 41 cents, or for 2,000 hours £168 15s., or about $819.

Electric light—100 lights of 20 candle-power each, equal to 2,000 candles :

Power required, say 11 indicated horse-power, at 3 lbs. of coal, 33 lbs. at 10s. per ton	1¾d.
Renewal of lamps, taking average durability at 1,500 hours, represents 1 lamp for every 15 hours to be renewed, costing 5s., cost per hour	4
Attendance, 5s. per week, £13 per annum, 1½d. per hour	1½
Oil and waste, 3s. 6d	1
Interest on first cost, say £300 at 5 per cent., £15 per annum	2
Repairs of machine, etc., and depreciation, 5 per cent. on £130, £6 10s	0¾
Cost of electric light per hour	11d.

or 22 cents, or for 2,000 hours, £91 13s. 4d , or about $444, thus showing an annual saving over gas of £77 1s. 8d., or about $375.

The estimate was not allowed to rest on these unsupported figures, but was corroborated by the records of two prominent mills, each of which had tried gas and electricity. The experience of the Messrs. Furlong & Sons, of Lappsquay Mills, Cork, Ireland, was (with gas at 3s. 11d. per 1,000 feet) that the electric system of illumination cost but £61 18s. per annum as against £114 17s. for gas. Messrs. Hall & Co., of Cork, who have used the electric light for two and a half years, stated that their gain had been fully 70 per cent. on the cost of gas per annum, In concluding his essay, Mr. Greenhill said: "I have only to direct attention to the safety of electricity, from fire, with properly erected installation, compared to gas. Personally, I do not consider there is one-fourth the risk of fire from the electric light; matches and naked lights are not required, and besides these points, the air remains perfectly pure in the mill, thus adding to the health and activity of the workmen. With respect to danger to life by using electricity, there is practically no danger whatever in using

direct current machines of low tension, such as are employed for incandescent lighting, nor is there much, if any, danger with arc light machines, presuming that it is not required to have too many arc lights driven off one machine."

A Case Under the Daly Act.

Before Judge Van Brunt, in the Supreme Court Chambers, argument was heard on the 30th ult. in the case of H. Clausen & Sons' Brewing Company against the Baltimore & Ohio Telegraph Company, the plaintiffs seeking to restrain the maintenance of a telegraph pole in front of premises Nos. 886, 888 and 890 Second avenue. This is the first case brought under the Daly act, passed at Albany on June 14, providing that telegraph, telephone, electric light and other wires and cables in cities of this State having over 500,000 inhabitants shall be laid under ground. The case began with an injunction against the telegraph company, granted by Judge Lawrence on June 21. The argument, on behalf of the Telegraph Company, was for the removal of the injunction. John E. Risley appeared for plaintiffs, and Grosvenor P. Lowrey, Edward R. Bacon, and Charles Francis Stone for defendants. The claim of plaintiffs, on which the injunction was based, was that they owned in fee the land in front of their premises, as far as the middle of the street, and that the city had merely an easement on such land for the purposes of commercial traffic, the erection of telegraph poles not being essential to such traffic. The plaintiffs claimed also that to stretch wires, as proposed, would obstruct light and air. Mr. Risley argued from these premises Wednesday, discussing also the desirability and practicability of the Daly act.

Mr. Bacon, for the defense, submitted 12 affidavits, intended to establish the right of the telegraph company to carry on the work as planned. The President and Vice-President of the company, by affidavit, explained the general project, which included connection with the Bennett-Mackay cable line, and said that interference with the work damaged the business of the telegraph company by $500 a day. Stephen D. Field, as an expert, submitted an affidavit that no system had ever been discovered for underground telegraphic communication in this country which was indorsed by practical men. Francis M. Ricketts, telegraph contractor for the Baltimore & Ohio, declared that the work for this company was more substantial and of better material than was usual in telegraphic construction. The affidavit of George W. Erb, Captain of Engine Company No. 12, certified that the work proposed could not interfere with the Fire Depa rtment in case of fire on the premises; and the affidavits of Sinclair Myers, of Scott & Myers, and of Edgar L. Pierson, of Cruikshank & Co., both real estate dealers, said that the value of plaintiff's property, either for selling or renting, would not be affected by what the telegraph company wanted to do. There was an affidavit also from James King, a tenant at No. 888 Second avenue, saying that he sat one day at a second-story window, in front of which the pole stood, and that during no part of the day was a shadow cast by the pole into his rooms, nor did the pole otherwise obstruct light.

Mr. Lowrey explained that the pole was 18 feet from the building, and that it was 61 feet high, so that the wires would run above the level of the roof. Counsel for defendants said that while questioning the constitutionality of the Daly act, as in conflict with an act of Congress, the company would run its wires underground could a practicable system be devised. Counsel offered also to idemnify the Clausens for whatever damages they may have sustained. Decision was reserved.

The Erie Telephone Company's Dividend.

On Friday, the 25th ult., in Boston, the directors of the Erie Telegraph & Telephone Company held a spirited meeting which lasted nearly three hours. Several important matters were discussed at length and some changes voted in regard to the future policy of the company. Regarding the payment of a dividend there seemed to be some division of opinion among the board. Some were in favor of paying the usual one per cent. quarterly, others three-quarters, and others one-half. According to President Ingham's statement, commencing July 1st, 1884, the company is earning above all of its payments four per cent. per annum. This allows from $10,000 to $12,000 a month for construction. Should the company pay a dividend of one per cent., or four per annum, at present it would not be able to reduce its debt, but would not increase it, the debt being less than $200,000; if three fourths of one per cent. were paid, a reduction on debt of $12,000 could be made each quarter, and if one-half were paid, of course $24,000 a quarter could be paid on the debt. President Ingham's recommendation was that two per cent. per annum, or one-half of one per cent., be paid as a dividend for the quarter ending June 30th, and that $24,000 be used in reducing the company's debt, A dispatch fro m Boston of July 29 says that the President's recommendation has been accepted. The company continues increasing its subscribers at the rate of 200 a month and has a favorable future ahead.

From New Orleans to the Brazils.—A company has been organized to lay a cable from Brazil to New Orleans *via* St. Thomas, to cost $3,000,000, which will work in connection with the Bennett-Mackay cable.

The Thomson-Houston at Elmira, N. Y.

The Thomson-Houston Electric Light Company, of Boston, Mass., has, says the Elmira, N. Y., *Advertiser* of July 28, afforded the people of Elmira an excellent opportunity of examining the merits of their fine light. The four burners at the Water street crossing and the several in stores and at Wisner Park have shed their radiance, excelled only by the sun, to the delight of all. The result of this free, and to Elmira valuable, exhibit has been the formation ot a company of Elmira's best business men to provide illumination by the Thomson-Houston system both by incandescent and arc lights. The name of the new organization is the Queen City Electric Light Company and the following are the incorporators: W. N. Estabrook, H. B. Berry, D. W. Payne, H. S. Brooks, C. C. Scott, J. B. Stanchfield, Charles Hazard, Antoine Romer, C. B. Tompkins, W. C. Buck, W. N. Pratt, A. M. Westlake and C. B. Dean.

The names are enough to insure success in any undertaking, and the incandescent and arc lights will be supplied to the satisfaction of all who desire them. The superiority of the Thomson-Houston lights has been established, not only in Elmira, but in many places this system of illumination has superseded older but less satisfactory methods. The power is provided by the Payne electric light engine, built in Elmira and acknowledged to be the very best power for the purpose, being perfectly steady. The new company deserves success and the excellence of their light will undoubtedly enable them to attain it.

Electric Light vs. Gas in Boston.

The Boston *Transcript* of July 18 has the following: "Five electric lights on the path through the Common from Park square to West street, burning all night and costing $3.25 per night, have been replaced by eight large gas burners, consuming thirty feet each per hour until midnight and six feet each per hour after midnight, and nine small gas lamps consuming five feet per hour each; which cost, assuming an average of ten and one-half hours per night, $2 58, leaving a balance of sixty-seven cents per night to pay for the labor of lighting at dark, making the change at midnight, extinguishing at daylight, cleaning lanterns and repairs. Question—What has the city gained or saved by the change to the inferior service? In Temple place there are now five large gas burners, three of which are extinguished at midnight, making the illumination of that thoroughfare more expensive than when the light was furnished by electric lamps. That the illumination is inferior may be seen by anybody who will walk from the electrically-lighted Washington street into the gas-lighted Temple place."

The Boston *Courier* makes the subjoined comment:

"Complaint is made from all quarters of the action of the city government in removing the electric lights from the Common, but the *Transcript* article fills the bill so completely that no further comment by us is necessary. There is another point we wish to refer to, however, and that is the poor quality of gas now furnished by the Boston Gaslight Company. With a reduction in price July 1 from $1.80 to $1.50 per thousand feet (16⅔ per cent.) the deterioration in quality is fully 33 per cent. It will be remembered that on the Fourth of July the same balloon which went up last year with at least 500 pounds more weight had difficulty in ascending and keeping up, using the Boston gas on both occasions. The writer can testify from personal experience regarding the poor quality of gas in household service."

The *Globe* adds to the weight of the above by giving both its hearty approval.

A Southern Feeder for the B. & O.

An important contract was made between the Baltimore & Ohio Telegraph Company and the Gulf, Colorado & Santa Fe Railway Company last week, which will open up for competition nearly the entire State of Texas. The Gulf, Colorado & Santa Fe Railway have wires already in operation between Galveston, Houston, San Antonio, Austin, Dallas, Fort Worth and other important towns, which will be connected within two or three weeks with the Baltimore & Ohio Company's lines already in operation to Texarkana. No opposition telegraph company has ever before reached that important territory, and the prospects of competition are gladly welcomed by the citizens of Texas generally. Mr. David Hall, a prominent telegrapher, with many years of experience in Texas, formerly manager of the Western Union at Galveston, has been appointed superintendent of the newly acquired territory. Mr. Hall left this city last Friday for the purpose of putting the work of additional construction under immediate progress. The necessary material, poles, wire, etc., have already been shipped to construct the lines between Texarkana and Paris, and between New Orleans and Houston, it being the purpose of the Baltimore & Ohio Telegraph Company to give the State of Texas two outlets to the North and the East. The railway company has already begun to add additional wires on their lines, and within two months ample facilities will be provided to all points in the far Southwest, it being the purpose of the Baltimore & Ohio Company to extend their system south to a connection with the Central American cable system. Very high tariffs have hitherto obtained to points in Texas, which will be largely reduced by the advent of the new company, and a severe blow will be dealt by this combination to the Western Union.

The New Central Cable Office.

By the erection of its own building at Nos. 16 and 18 Broad street, the Western Union Telegraph Company has secured an office admirably suited to its wants.

The new building covers two Broad street lots and is about fifty feet in width by seventy feet in length, and is eight stories in height. The ground floor front is of beautifully carved brown stone. The other stories are of brick with a light facing of brown stone and ornamental trimm ngs. At either end of the first floor front are medallion heads of Franklin and Morse, skilfully executed.

The telegraph company occupies the whole of the ground floor with the exception of a small portion of the front, which is now leased by a broker firm, but to which it is the intention to remove the office of the American District Telegraph Co., now situated a few doors below. The other floors will be leased, excepting the top floor, where the Gold and Stock Telegraph Co. will make its down-town headquarters.

The operators assigned to this branch of the business are usually the best in the service of the company, none but the most expert operators being allowed to transact the business.

The average traffic at present is about 4,000 cablegrams per day.

The Silver Voltameter.

At the last meeting of the Physical Society for the present session, Lord Rayleigh, President-elect of the British Association, exhibited the platinum-bowl voltameter which he has designed for measuring the strength of an electric current. This, says *Engineering*, is the best means yet found for estimating the current in absolute measure. The platinum bowl is the cathode in his apparatus; the anode being a sheet of silver wrapped up in clean filter-paper sealed round it. The filter paper is a sheath for the anode to catch any grains of silver which may be loosened from it in the act of decomposition, and prevents them from falling in on the bottom of the bowl or cathode. The bowl is filled with a solution of silver salt, the pure nitrate or pure chlorate being preferred. Silver acetate ought not to be used, as it does not give such good results. The anode is dipped in the solution till the sheet is quite immersed; and the current turned on. One ampère deposits 4 grammes of silver in an hour, therefore a quarter to half an hour is sufficient to give one to two grammes, a quantity which can be weighed with sufficient accuracy in a chemical balance. Any current from $\frac{1}{15}$ to 5 ampères can be successfully measured in this way.

Telephonic Facts and Fiction.

To the Editor of The Electrical World:

Sir: The many misstatements in Mr. Randall's last letter are closely parallel to Prof. Thompson's attempt in his well-known book to mislead those who are not fully versed in telephonic matters.

It is therefore with an apology to the majority of your readers that I remind the few others who have not followed telephone history closely, of the fourth claim of Bell's patent of March 7, 1876, which reads:

"The method of producing undulations in a continuous voltaic circuit by gradually increasing and diminishing the resistance of the circuit, or by gradually increasing and diminishing the power of the battery as set forth."

I think that in view of such gross misrepresentations as are contained in Mr. Randall's letter I am entitled to an excuse when I decline in future to discuss telephone rights and inventions with the gentleman.

July 29, 1884. E. Berliner.

The Late Volkmar.

To the Editor of The Electrical World:

Sir: The New York *Herald* of July 23 published a cable message from Paris respecting the death of Volkmar, in which mention is made of his having started the Faure Accumulator Co. As this is absolutely incorrect, will you allow me, as a friend of Mr. Faure's, to give you a faithful account of Volkmar's connection with the Faure Accumulator, which has been incorrectly styled the "Faure-Sellon-Volkmar," more particularly in Europe?

Volkmar's history reflects nothing to his credit. In the summer of 1881 he was introduced to Mr. Philippart, the president of La Force et la Lumière, by an American.

Volkmar obtained employment in the workshops of the French company. Here he began his scheming. He soon acquired an ascendancy over two of Mr. Philippart's sons, both of whom were holding responsible positions in the company, and by his assiduous efforts he so worked upon their minds that during Mr. Faure's and Mr. Philippart's absence from Paris he attempted to dispose of patent rights, etc., the company's property, and when caught and convicted in the act of treating with parties with whom he had no right to have any dealings he suddenly left Paris, taking with him the younger Philippart, who was at that time under age.

He next turns up in London, where he worked in the

profoundest secrecy for nearly six months under the auspices of Mr. Sellon of the Anglo-American Brush Co.

Volkmar was not an electrician; he had not been long enough in the French workshops to obtain more than a smattering, so while Volkmar's name was always prominent, the real worker was Gustave Philippart, who was possessed of all the secrets and cognizant of all the experiments made in the workshops by Mr. Faure.

The Faure Accumulator Co. was formed by Mr. Philippart, senior, acting as President of La Force et La Lumière, early in 1882; during the first few months of its existence it was managed by a board of honorable men.

The Electrical Power Storage Co. was formed some three or four weeks later than the Faure Co. From the very first it was manifest that these two companies must be antagonistic to each other, since the Faure Co. possessed the real Faure patent, while the other company could merely boast of their title to what they knew to be an infringement of the Faure, which they called the Sellon-Volkmar, but in reality was nothing but Gustave Philippart's reproduction of Faure's latest improvements.

Naturally enough Faure commenced suit against Volkmar for infringement, and though many people may have been under the impression that this matter was settled, as a matter of fact it has never been so.

Volkmar owes his prominence to a little electrical financing which was exposed at the time in *Truth* (London). Mr. Philippart, having been refused a seat at the board of the Faure Accumulator Co., determined to be revenged. He compromised with Volkmar on a secret deal, obtaining from him a large sum of money, with which he bought up all the unissued stock of the Faure Co., and then the control of the issued stock, afterward handing over the rights of the Faure Co. to the Electrical Power Storage Co., thereby ousting the original shareholders out of their rights, since practically they obtained no consideration whatever for the transfer.

Volkmar reached the zenith of his career toward the end of 1882, and it is reported of him that he paid up a vast accumulation of gambling debts in Paris; but his loose habits and swindling methods of business ultimately caused him to fall out with his best friends, Mr. Sellon, *et al*, and caused his dismissal from the company. Since that time he had been hanging about Paris, and as far as I know was much embarrassed in money matters.

VERAX.

NEW YORK CITY, July 24.

THE TELEGRAPH.

THE August 1 number of *The Operator* contains a fine portrait of President D. H. Bates, of the B. & O. Telegraph Company, accompanied by a full biographical sketch.

A BOND NOT TO CONSOLIDATE.—In Philadelphia the City Solicitor has, by a resolution of City Councils, just commenced a suit against the Bankers & Merchants' Telegraph Company to recover upon a bond of $20,000, which the company gave the city as a guarantee that they would not consolidate with any similar company.

THE BENNETT-MACKAY CABLE.—G. D. Roberts, who is interested financially in the Bennett-Mackay Atlantic cables, says the cables will be ready for public service on Oct. 1. The cost will reach $7,000,000. The rate for cablegrams will be materially less than by the old cable, but how much less Mr. Roberts declined to say.

FOUR MILLION WORDS.—The fact that in the eight days consumed by the two political conventions at Chicago four million words of specials were sent promptly by the various telegraph companies, speaks volumes for the efficiency of the telegraph chiefs, operators and construction men. Chicago earns her reputation of being great.

READY TO COME IN.—A dispatch from Montreal of July 24 says: Canadian Pacific Railway General Manager Van Horne expresses his intention of joining the new telegraph combination in the United States for extending its operations throughout Canada, when the company's lines, now far advanced, are finished, which is expected to be accomplished very shortly.

FARGO, DAK.—The new wires for the fire alarm system are, says the *Argus*, being stretched all over the metropolis. Colonel Douglas says that these are the heaviest telegraph wires made, and will be strung on posts belonging to the American District Telegraph Company. It is rumored that the present system is to be supplanted by the Gamewell system with the American District Company as the joker.

A SHORT CANADIAN CABLE.—Arrangements have been completed for connecting the quarantine station at Grosse Isle with Quebec by submarine cable and land lines. This route will be a boon to pilot service and also to the numerous inhabitants of Orleans Island, and will provide reliable connection with Grosse Isle. It has also been decided to establish telephonic communication between the hospital and convalescent ends of Grosse Isle.

B. & O. CONTRACTS.—A contract was executed Thursday transferring the control of the telegraphic wires on the line of the New York, Ontario & Western Railroad, between New York and Oswego, from the Western Union to the Baltimore & Ohio Company. The contract will take effect Aug. 6, on which date the present contract of the Western Union will expire. This new arrangement terminates a bitter struggle which has been going on for several months between the Western Union and the Baltimore & Ohio companies for possession of these wires. The Baltimore & Ohio telegraphic system gains about 100 important offices, and it is claimed that the company will now be able to reach more points in this State than have ever before been operated by any line in opposition to Western Union. Since Mr. Bates became president and general manager of the Baltimore & Ohio Telegraph Company, that organization has succeeded in making favorable contracts with a large number of railroads, among them being the West Shore, Nickel Plate New York, Ontario & Western, Cincinnati, Washington & Ohio, Ohio & Mississippi, and Gulf, Colorado & Santa Fe.

MUTUAL UNION WIRES IN CHICAGO.—As we mentioned last week, the City Council of Chicago have passed an order directing that all Mutual Union telegraph wires running into the city be cut. It was stated that when the wires were cut a year or more ago, the company agreed to put its wires under ground; that no attempt had been made to do so, and that additional wires were being strung. In reference to this action Dr. Norvin Green, President of the Western Union Telegraph Company, which controls the Mutual Union, said in a late interview: "There will be no wires cut. Our Chicago superintendent telegraphed us that he had seen the Mayor and arranged the matter with him. The fact is that we have been a little slow about the work, and the action of the city authorities is designed, I suppose, to hurry us up. We obtained permission from the city to string some additional overhead wires (which we promised absolutely to put under ground) for the accomodation of the recent political conventions. The new wires were in cables all ready to place under the surface, but the work had been delayed, because we have not yet received the iron pipes in which the cables are to be placed. If we had the pipes, all we should have to do would be to dig the trenches, and, after laying the pipes, to draw the cables through them. We shall put the wires underground according to our promise."

THE TELEPHONE.

TWO new Western Electric Company's switch-boards have been put into the exchange at Fargo, Dak.

UNDER THE MCDONOUGH PATENTS.—The United States Telephone Company, using the McDonough patents, is about organizing a sub-company for the State of Connecticut.

THE DOLBEAR IN VERMONT.—It is said that the Dolbear telephone is to be introduced into Vermont, in opposition to the instruments now used by the American Bell's New England Company.

NATURE'S BIG TELEPHONE.—The Grand Cañon of Colorado is a remarkable transmitter of sound. A train of cars crossing the bridge at Needles is heard on a quiet day at Cottonwood Island, eighty-four miles away. And the sunrise gun at Fort Mojave is said to awaken sleepers at El Dorado Cañon, ninety-six miles away.

AMERICAN PORTABLE TELEPHONE.—In reply to many inquiries, we may state that an illustrated and descriptive article on this telephone apparatus will appear shortly in these columns, when their various questions as to details of operation and the like will be fully met. Several satisfactory trials have been made during the week with the experimental apparatus referred to last week.

A GOOD REPORT.—The June report of the New England Telephone Company shows a net gain of 229 subscribers in June and a present number of 18,437 subscribers. The extra territorial messages transmitted during the month were 28,282, a gain of 1,767 over the previous month. Five hundred and ten cities and towns are now connected by telephone in this company. The net gain in subscribers since Jan. 1 is 1,438.

IN THE EMPIRE STATE.—The Northern New York Telephone Company are to build two new connecting lines at once in order to secure the territory and increase the number of telephones. It has therefore been voted to pass the dividend and devote the money for the construction. The company is said to be in a prosperous condition. At the meeting, Dr. Pinkham was reappointed President, and Warren Fox Vice-President. The Treasurer's report showed that in bills receivable and in cash the company had between eight and nine hundred dollars. Since last summer 187 telephones have been added, and it is said the outlook for the company is very flattering. Dr. Bradt is Secretary of the company, and will give any additional facts desired.

LONG DISTANCE TESTS.—A dispatch of July 28 from Hartford, Conn., says: A test of telephoning over a long distance was successfully accomplished to-night. The experiment was made in this city by the United States Telephone Company with the McDonough telephone. The station in this city was in the Charter Oak Life Insurance building, which was connected with the station of the Bankers & Merchants' Telegraph Company, at No. 187 Broadway, New York. A metallic circuit, connected over the wires of the Bankers & Merchants', was put in service through Philadelphia, running into the office at New York and completed at Hartford. This gave a speaking distance of over 350 miles. This test was very successful; every articulation was distinctly heard, the operator in New York pitching his voice at different modulations, and every intonation was distinctly recognizable. A general conversation relative to the weather, politics and current events was carried on with ease.

AROUND SALT LAKE.—It would be inconsistent, says the Salt Lake *Herald*, for a person to presume that, in consequence of the dull times, the Rocky Mountain Bell Telephone Company in this city suffers a diminution in trade. It is, on the contrary, doing a very successful business, and its prospects are exceedingly bright, not only in this city, but elsewhere. A visit to the central office or a few outward observations, will soon convince a person that the progress made the last year by this popular company is very gratifying. Connection by telephone is soon to be made with Centerville and Farmington, and also with the salt works a few miles west of Farmington, owned by the Utah Forwarding Company. Telephonic connection will probably be made before the close of this year between Salt Lake and Provo and the intermediate towns. The consummation of this scheme and other contemplated improvements depends largely upon the good disposition and liberality in taking scrip of those to be benefitted by these schemes. A number of towns in the immediate vicinity of Provo are, however, to be telephonically connected in a short time. From the amount of business done over the wire between Ogden and Park City and to the Lake, it would be safe to infer that these public conveniences are heartily appreciated. Everything about the telephone, using plain terms, is flourishing, and it is to be hoped the contemplated improvements will be carried out before snow flies.

THE ELECTRIC LIGHT.

DETROIT, MICH.—The American Company, Boston, Mass., have just closed a contract with several prominent capitalists at Detroit, Mich., for the construction of a 200-light plant in that city, to begin with 100 lights. The company expect also to commence operations in September on a 100-light plant at Port Huron, Mich.

AN EXHIBITION AT ROUEN, FRANCE.—The city of Rouen has organized in connection with the Concours Regional an exhibition of electricity for the whole of France, and a special exhibition of Algerian products. The number of electrical lamps, regulator and incandescent, is very large—about 400 Swan, some Maxim, 30 Breguet regulators, about 30 Jablochkoff, and 5 or 6 sun lamps.

THE HOLMAN LANTERN MICROSCOPE.—Not the least interesting part of the Philadelphia electrical exhibition, in the opinion of the Baltimore *Sun*, will be that which is to involve the illumination by electricity of the Holman lantern microscope. This instrument, is of the highest use in public lectures, but in presenting to entire audiences magnified objects that without it could never have been projected upon a screen, it has hitherto been illumined only by the lime light. Now, however, it is undergoing alteration with a view to employing electricity as the illuminating agent. The objection to this heretofore has been the unsteadiness of the light owing to the liability of the current to interruption. A number of electric lamps have already been offered, in which the inventors believe that they have overcome this difficulty, and to each a fair trial will be accorded if the purpose of having attractive illustrated lectures delivered during the progress of the exhibition is carried out, as it now seems likely to be.

GENERAL SUPERINTENDENT OF THE AMERICAN COMPANY.—Major L. B. Wright, for three years General Superintendent of the Brush Electric Light Co., and for the past year Engineer of the Jarvis Engineering Co., of Boston, has tendered his resignation to the latter company, to accept the position of General Superintendent of the American Electric and Illuminating Company, vice C. D. Smith, who assumes the position of General Manager. Since the American Company was organized Mr. Goff has occupied the position of President and General Manager; but the rapid growth of the business has necessitated a division of responsibilities, as he finds himself unequal to the management of the entire details of the business. Mr. Smith's experience in the business fits him for the new office he is to fill, and Major Wright's long and successful experience as a mechanical engineer, and his thorough knowledge of the electric-lighting business generally, make him a valuable acquisition to the American Company. Major Wright is a brother of the Hon. Carroll D. Wright, so well and favorably known in Boston.

A FRENCH DOMESTIC INSTALLATION.—*L'Electricien* gives some particulars of the lighting of M. Gaston Menier's house. The installation comprises 150 forty-volt Swan lamps, requiring .7 ampere of current, which are fed by 22 Faure-Sellon-Volckmar accumulators of the 60 kilogram type, mounted in series. These accumulators will give normally from 40 to 45 amperes, or sufficient current for 60 lamps at once. They are charged every day by a Gramme continuous current self-excited machine. This is driven by an Otto gas engine of five-horse power. With a little practice, the servant who has charge of the lighting estimates with sufficient accuracy the night's consumption in ampère-hours, and recharges the accumulators with just the amount expended, allowing them about 10 to 15 per cent. extra to make up for losses or errors. Suppose, for instance, that during the night 60 lamps have been alight for 4 hours. The total consumption in ampère-hours will have been:—$60 \times .7 \times 4 = 168$ ampère-hours. He will charge the accumulators on the following day for about 5 hours with a current of 40 ampères, or, in other words, $40 \times 5 = 200$ ampère-hours. The accumulators which have been in use for six months or more have only required partial renewing. It is thought that this method of running lamps from accumulators is preferable and more economical than that of feeding them direct from the machine, even though the first cost of the accumulators is by no means a small item.

MISCELLANEOUS NOTES.

A NEW DYNAMO.—We find the following in the Chicago *Journal of Commerce:* A German physician has invented a dynamo which he claims will generate electricity at one-fourth the present cost. A Pittsburg firm is erecting a plant at a cost of $150,000 to manufacture the new machine.

TO REPRESENT MEXICO AT THE EXHIBITION.—Señor Enrique R. Mexia has been delegated by the President of Mexico to represent that country at the International Electrical Exhibition. Señor Mexia will also represent the Republic of Mexico at the National Congress of Electricians, which will convene some time during the progress of the exhibition.

A REMARKABLE ACCIDENT.—Mrs. Thomas Rowland, of Springville, Ala., seeing a storm approaching, took refuge with her five little children in a cyclone pit under the house. The lightning struck a tree in the yard, the roots of which ran into the pit, and the fluid followed the roots with fatal results. The infant in the arms of the mother at the time she was struck to death was not injured.

ELECTRIC RAILWAY PATENTS.—Mr. Stephen D. Field says that the favorable decision of the Patent Office last Friday on his electric railway claims establishes his priority in this country on the broadest grounds, and that the Siemens, Edison, Daft and Knight-Bentley locomotive devices touch his patent rights in half a dozen points. The controversy will soon become very interesting.

GATE OPENERS FOR LEVEL CROSSINGS.—A French paper says that the railway companies are about to try an electric gate opener. The method to be tried is briefly as follows: A catch connected with an electro-magnet keeps the gates closed. An approaching train closes the circuit at a certain distance from the gates, the catch is released and the gates open. When the last carriage has passed the circuit is broken again and the gates close. A bell is also rung as the train approaches.

ELECTRIC CONDUCTIVITY OF SOLUTIONS.—According to the recent researches of M. Bouty, the neutral salts in very extended solutions of water form a group apart as regards their electric conductivity. For example, ethylic alcohol, glycerine, erythrite and phenol, glucose and candied sugar, ordinary ether and dichlorhydrine, ethylic aldehyde and acetone, as well as albumen, all conduct very badly. M. Bouty has also come to the conclusion, from his experiments, that an anhydrous alkali or acid is not a conductor, but that a hydrated acid or alkali conducts like a salt.

JERSEY MOSQUITOES NOWHERE.—Some of the insects have electric organs for defense. Gen. Davis, of the British army, who was a famous insect collector, once picked up a wheel-bug in the West India Islands, and received a blow that paralyzed his arm for some time. As he shook the insect off he noticed where it had stood on his hand six red marks, the impression of his feet. Kirby and Spence also refer to this peculiarity of the insect, and other naturalists have received shocks from certain of the luminous beetles. In one case, that of Capt. Blakeney, life was almost destroyed. This gentleman took up an unknown caterpillar, and immediately received such a shock that his entire right side became paralyzed, and for a long time he was dangerously ill.—*Cincinnati Enquirer.*

THE KNIGHT-BENTLEY RAILWAY.—A despatch of July 27, from Cleveland, O., says: The first electric railroad for public use in America went into operation in this city yesterday, in connection with the East Cleveland Street Railroad Company, which has just completed a mile road. The experiment was so successful that the company expects to change its entire system, comprising over 20 miles, into electric roads. The system used was a combination of the Brush and Knight & Bentley systems, and the current was carried on underground conductors, laid in conduits like those of cable roads. The cars were started and stopped and reversed with the greatest ease. Any number of cars up to 15 can be run at one time on a single circuit, which is a result not attained by any of the European systems now in operation. The success of the new road has made a great sensation in both street railroad and electrical circles, and is expected to greatly extend the field of electrical development, as well as enhance the value of street railroad properties.

DRY BATTERIES.—MM. Becquerel and Onimus, the London *Electrician* states, have been experimenting on dry batteries. Many have endeavored to obtain a dry cell by mixing sand with chlorhydrate of ammonia. The two above-mentioned obtain a modification of this process by mixing plaster with the exciting liquid, and then allowing it to solidify. As this plan can only be adopted with those cells which work only when the circuit is closed, the chlorhydrate of ammonia and chloride of zinc cells are the only ones that can be used to any advantage. Instead of using plaster only, MM. Becquerel and Onimus sometimes mix peroxide of manganese or sesquioxide of iron with it. In these cases the E. M. F. is slightly greater. When the battery has run down, all that is required is to moisten with more exciting liquid. The common defect of all dry batteries is that the quantity of exciting liquid being a minimum, the total electrical energy they are capable of furnishing before being recharged is also a minimum.

WESTINGHOUSE WEALTH.—Thus says the *Milling World*: "To him that hath shall be given." George Westinghouse, before he invented and perfected his well-known air brake, was regarded by a number of his then acquaintances with something approaching pity, because of his alleged lack of "gumption." His air brake was a success, and his friends began to think there was something in him after all. His automatic engine added to his fame and bank balance, and he mounted higher in the esteem of his former friends. A few weeks ago a valuable well of natural gas was struck on his premises at Homewood, near Pittsburg. The well is 1,580 feet deep, and the flow of gas is tremendous, the roar being almost deafening and scarcely endurable to the citizens of the neighborhood. Two other wells are being put down by Mr. Westinghouse, and he estimates that his profit therefrom will soon amount to $1,000 a day. We don't know what he wants of those wells, as he is not in straitened circumstances, but if some of those former friends don't just about bow down and worship him ere long, we'll miss our guess.

STOCK QUOTATIONS.

Telegraph, telephone and electric light quotations on the New York Stock Exchange, Boston Exchange and elsewhere are as follows:

TELEGRAPH.—Am. Cable, b 52½, a 54; Bankers & Merchants', a 27; Mutual Union, b 13½, a 14; Postal Stock, b 5, a 5⅝; Postal 1st, 6 p. c., b 45, a 46½; Postal Tel. & Cable, a 14; Western Union, b 61, a 61¼.

The important pooling arrangement between the Baltimore & Ohio, the Postal, and the Bankers & Merchants' Telegraph Companies went into effect on the 1st inst. These three companies will be operated under joint management with the following named officers: Executive Manager, David H. Bates; General Manager, Garrett S. Mott; General Superintendent of the Eastern Division, James G. Smith; General Superintendent of the Western Division, John E. Zeublin. The Eastern Division embraces the territory east of Ohio, including the old Southern Company's lines, and the Western Division embraces all of the territory west of and including Ohio. The respective headquarters of the two divisions are in New York and Chicago.

TELEPHONE.—American Bell, ex. div., a 155; Erie, b 18, a 18½; Mexican, a 1¼; New England, b 21, a 22½; Tropical, a 1½.

There are very few transactions reported in Bell stock.

The Boston *Herald* of July 31 thus reports the local market:

New England Telephone rose to 22¼, while Erie was steady at 18¼. New England passes the quarterly dividend, and Erie pays a reduced amount, as shown below.

The Erie Telephone Company has declared a dividend which it was expected to do if it declared any—½ of 1 per cent., payable Aug. 9 to stock of Aug. 4. The earnings for the quarter ending June 30 were $139,493.17; expenses, $72,812 94; net earnings, $66,686.23. From this should be deducted $26,506.68 paid out for construction, leaving $40,179.55, or 3.3 per cent. on the issued capital of $4,800,000. The dividend declared is $24,000, which will leave $16,179.55 applicable to the floating debt of about $200,000. The number of telephone subscribers July 1 was 9,267, a gain of 325 for the quarter.

ELECTRIC LIGHT.—American, b 9; Edison, b 75, a 100; Edison Isolated, a 70

The Boston *Globe* of July 29 says: It is now generally understood that the American Electric and Illuminating Company will pay, in addition to its regular 4 per cent. semi-annual dividend, due Sept. 1, the usual 2 per cent. extra semi-annual dividend on its preferred and common stock, which makes the preferred 12 per cent. and the common 4 per cent. per annum on the par value of $10 per share. This will be the fourth regular dividend paid since the company's organization, and whatever people may have thought two or three years ago about the ultimate success of electric lighting, it is now a thoroughly and well established fact that a good system of electric lighting, conducted on sound business principles, can be made a financial success. This fact has been fully demonstrated by the American Company, and it has well earned its position as one of the solid institutions and regular dividend-paying companies of Boston.

The financial editor of the *Sunday Courier*, in his financial article yesterday, struck the keynote to the electric light vs. gas situation, as follows: It is claimed that thus far the electric light has not injured the gas interest, from the fact that those using gas are compelled to consume a larger quantity in order to compete successfully with the brilliancy of the electric light This is undoubtedly true as the first effect, but no gas producers will be any the less sensitive on the main point of the success of the electric light as an illuminator. They know that in the "long run," as surely as the light of day is superior to any artificial illuminator, that gas must be very largely superseded by the electric light; it is one of the inevitables that scarcely admit of an argument. Gas may and will to a certain extent create other uses for it, but as an exclusive illuminator itself day has passed. The electric, now a competitor, must naturally assume the supremacy, because its light is a better and more brilliant one than it is possible to produce with gaslight.

Kohlsaat & Co., No. 30 Pine street, furnish the following quotations for miscellaneous securities:

	About.		About
American Electric Light	9	American Bell Telephone	154
Edison Electric	95	People's Telegraph	17
Edison Isolated	70		

BUSINESS NOTICES.

CUMMER ENGINES.—The Cummer Engine Company, of Cleveland, O., have just shipped a 55 horse-power engine, with outfit complete, to the Goshen Electric Light Company, Goshen, Ind. Other large orders await attention.

PAYNE ENGINES TO THE FRONT.—B. W. Payne & Sons, Elmira, N. Y., have recently put in a 25 h. p. electric light engine for the Thomson-Houston Company in that city. They have also supplied lately a 25 h. p. engine for a new summer hotel at Charlotte, N. Y.; two 50 h. p. engines for Brush lights in Chicago; a 50 h. p. for the same at Joliet, Ill.; a 20 h. p. for electric lighting at the rubber works, Trenton, N. J.; six 6 h. p. engines and two 10 h. p. for Mississippi River boats. They are now furnishing two more 50 h. p. engines for immediate shipment to Chicago.

OUR ILLUSTRATED RECORD OF ELECTRICAL PATENTS.

Edited by N. S. KEITH, Electrical Engineer and Expert, 9 Murray Street, New York.

PATENTS DATED JULY 15, 1884.

Armature for Dynamo-Electric Machines; S. F. Van Choate, of New York City..... 301,062

A sectorally-divided annular-armature core, of the Brush type. The features are perforations through the polar enlargements, and the plates used for the purpose of fastening the sectors together.

Armature for Dynamo-Electric Machines; E. A. Edwards, of Cincinnati, O., Assignor to O. M. Gottschall, Trustee, of Dayton, O..... 301,872

This armature, and the machine to which it belongs, was described at length in issue of THE ELECTRICAL WORLD of May 3, 1884.

Electric-Arc Lamp; S. F. Van Choate, New York City..... 301,061

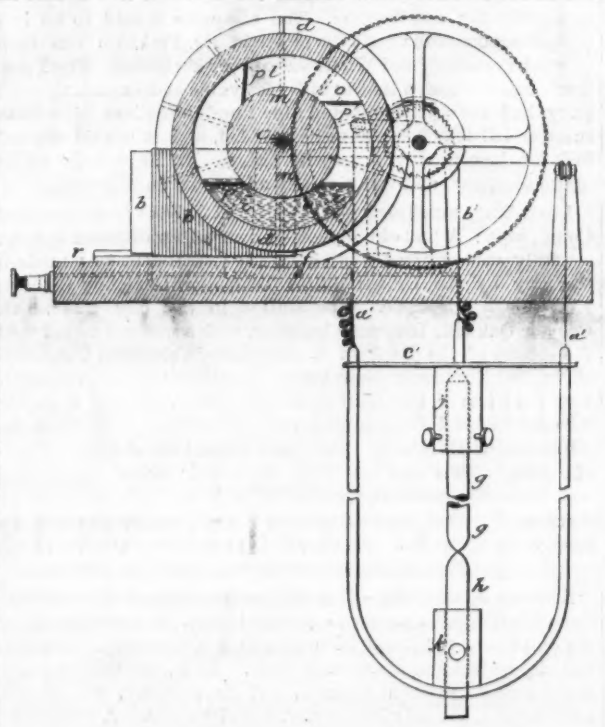
Uses two distinct automatic feed movements in regulating the carbons; one acting with and the other without magnetic influence. There is a peculiar arrangement of magnets and circuits to secure low resistance. Artistic effect is aimed at.

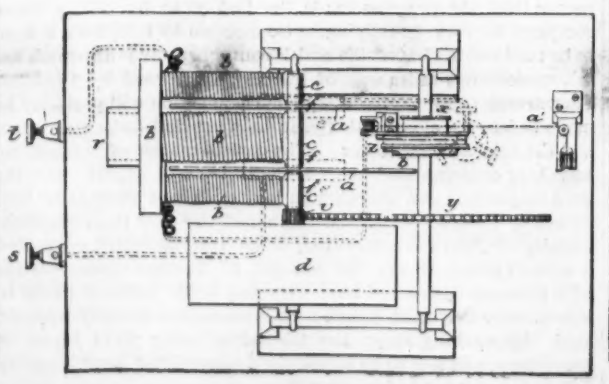
Electric Temperature Regulator; C. A. Tucker, of Islip, New York..... 302,215

Consists in the peculiar construction and arrangement of parts.

Regulator for Electric Arc Lamps; Andrew and Thomas Gray, of Glasgow, Scotland..... 302,221

The electro-magnetic action between the magnetic field and the current in the discs *a* causes them to turn around until the turning-couple is balanced by opposite couple, due to difference of levels of the liquid *i* in the two sides of the hollow drum *d*, and in the resultant couple given by the carbons and their holders *j* and *k*. The hollow space *l* in it is the annular space between two coaxial cylinders *m* and *d*. This space is divided into compartments by partitions *o*, all inclined at the same angle to the radius, as shown, and each partition is pierced at its outer end with a small orifice *p*. In consequence of this difference of levels, the liquid flows through the orifice *p* in the partition *o* of the drum *d*, and the discs *a* turn round slowly in obedience to





the resultant of the electro-magnetic and gravitational action. The discs actuate the carbons in the following manner: On the disc-shaft is a pinion *v*, gearing into wheel *y* on a shaft carrying two drums *x* and *z*, on which cords *a'* and *b'* are adapted to be wound, respectively. Cords *a'* are connected to the side rods of the lamp, to which the lower carbon *h* is attached, while *b'* is connected to upper carbon *g*, which is attached to plate *c'*, sliding on rods *a'*. By this mechanism any motion of the discs is communicated to the carbons, rotation in one direction separating and in the other approaching them. The electro-magnetic action tends in the first place to separate the carbons *g* and *h* until this action is counterbalanced by the gravitation of the carbon-holders *j* and *k* and carbons *g* and *h*, while the drum *d* prevents any great sudden change in the length of the arc from taking place, thus insuring steadiness of the light. At the same time, if by any accident the current ceases to flow, the difference of the weight of the carbons *g* and *h* and their holders *j* and *k* is sufficient to turn the drum *d* so as to close the arc.

Incandescent Electric Lamps; G. W. Hickman, of Washington, D. C., and J. F. McCoy, of Rahway, N. J., Assignors to the Viaduct Man'f'g. Co., of Baltimore, Md..... 301,133

Consists in construction and arrangement of parts of a holder and switch.

Method of and Means for Generating Currents for Telegraphic Purposes; P. H. Vander Weyde, of Brooklyn, N. Y..... 302,175

Consists in apparatus and method of using the same, by which the impulses of current are prolonged; there being less intermission and a more gradual rise and fall. All for the purpose of lessening inductive action upon lines near the one to which the apparatus is attached.

Producing and Utilizing Induced Currents; P. H. Vander Weyde, of Brooklyn, N. Y..... 302,176

Consists mainly in the use of a much elongated core for inductoriums, it having been found that the tension of the induced current is lessened thereby, and the strength of current at the same time is increased.